

# STAGING THE FUTURE

CRADLE TO CRADLE SOLUTIONS  
FOR THE CULTURAL SCENE  
AND SOCIETY

REPORT

As part of the  
transformation project



# EXECUTIVE SUMMARY

German rock bands 'Die Ärzte' and 'Die Toten Hosen' are making four concert dates available in August 2022 at the Tempelhof Airport in Berlin to implement a pilot laboratory project designed to accelerate business transformations toward a Cradle to Cradle (C2C) circular economy. The project initiators, Cradle to Cradle NGO, KKT GmbH – Kikis Kleiner Tourneeservice, Loft Concerts GmbH, and Side by Side Eventsupport GmbH, will test products, processes, and innovations that are as climate- and resource-positive as possible in the “Labor Tempelhof” (Tempelhof laboratory) and will test their scalability. In cases, in which a C2C solution was not possible due to a lack of technical implementation options or for cost reasons, the best possible ecological alternatives were implemented. The aim is to show how already existing C2C, circular, and sustainable solutions can lead to added value and positive economic, ecological, and social impacts, and which political and economic framework conditions are still missing in order to be able to scale these innovations.

The concerts will act as the testing ground on which C2C innovations and sustainable alternatives from the areas of mobility & logistics; energy; nutrients, food & agriculture; water, buildings & construction; textiles; plastics & packaging; as well as digitization are to be planned and implemented. The impact of these measures will be quantified in cooperation with strategic management consultancy, Boston Consulting Group, and the think-and-do-tank for climate, environment and development, adelphi, and transparently published in a guidebook as a blueprint for the event branch. The present report, on the other hand, describes missing and misleading framework conditions that were identified while implementing and organizing the concerts and working on the impact evaluation.

The evaluation showed that political and economic incentives and framework conditions must be redirected in such a way that they enable and accelerate the necessary transformation from a linear to a circular economy. This framework must ensure that economic and social action always achieves economic, ecological and social added value. The legislative proposals and amendments discussed at both the EU level and the German federal level for the political goal of a circular economy are not sufficient in the form currently envisaged to bring about real change. This is particularly evident in the following areas: in the expansion of renewable energies, where the circularity of generation facilities is not considered; in the absence of positively defined quality standards for textile products and plastic products, which should include social aspects in addition to material health and circular design; and in the current agricultural policy, which is negotiated separately from the EU's Circular Economy Action Plan and thus ignores nutrient cycles between industry/commerce and agriculture.

Labor Tempelhof shows that these regulatory gaps do not only apply in the context of events. They must be closed in order to achieve the political goal of a truly circular economy.

### Initiators:



### Facilitators:



### In cooperation with:



[www.labor-tempelhof.org](http://www.labor-tempelhof.org)

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# 1. PREFACE

## 1.1 IDEA AND CONCEPT OF THE “LABOR TEMPELHOF” PROJECT

“We are convinced that cultural and artistic impulses can promote the emergence of our society, inspire it, and create public spaces for debate.” This is what the Federal Government of Germany has written in its 2021-2025 coalition agreement.<sup>1</sup> Culture should be made possible for everyone by ensuring its diversity and freedom. Therefore, the German Federal Government wants to promote a strong cultural scene and creative industries.

At the same time, the cultural industry has been faced with the task of starting anew after three years of the corona pandemic, during which time event operations were partially or completely slowed to a halt. This, of course, led to corresponding financial and personnel losses. During this time, raw materials and products have become enormously more expensive as a result of the coronavirus pandemic, but also as a result of events such as Russia's war against Ukraine. At the same time, political awareness of a necessary socio-economic transformation has grown. The problems of our current linear production method according to the “take – make – waste” principle are also evident at events, especially at large-scale events. An immense amount of resources are consumed and, in the worst case, a lot of waste is left behind, which can be harmful to people and the environment. The planned Green Culture contact point, with which the German Federal Government intends to support the cultural industry in its ecological transformation, also shows that the cultural and event industry should develop towards greater sustainability.

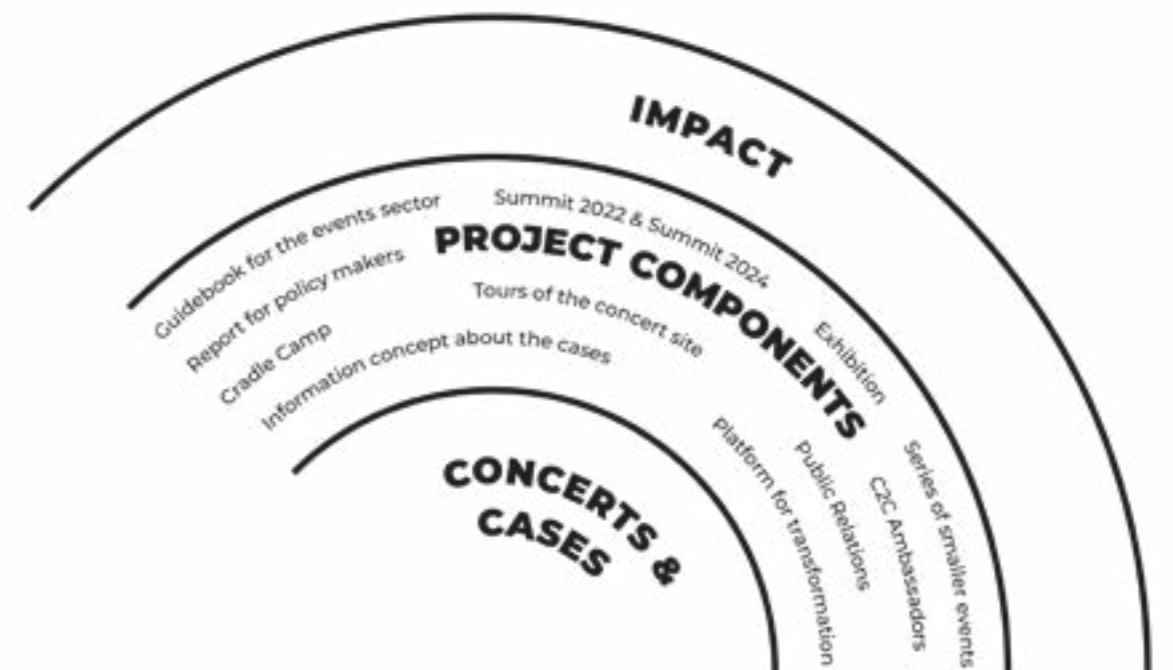
The bands **Die Ärzte** and **Die Toten Hosen** are making four concert dates available in August 2022 at the Tempelhof Airport in Berlin for a laboratory project in which the project initiators **Cradle to Cradle NGO, KKT GmbH – Kikis Kleiner Tourneeservice – Loft Concerts GmbH and Side by Side Eventsupport GmbH** will implement, test, and evaluate the scalability of products, processes, and innovations that are as climate- and resource-positive as possible. The implementation will take place together with numerous partners. **The aim of this project is to show how existing Cradle to Cradle (C2C), circular, and sustainable solutions can lead to a circular economy that offers economic, ecological, and social added value for society as a whole – and how large-scale events with positive effects for people and the environment can become the new standard.**

The concerts are to be the testing ground for a future according to C2C. Solutions may also fail there, and these will allow us to deduce which hurdles still exist and which framework conditions and structures are necessary to make large-scale events with a positive economic, ecological, and social footprint easy to implement and to positively influence production decisions. In this report, the results of the four concerts are generalized in places for the entire event industry. Although multi-day festivals, indoor concerts, or clubs are different formats, individual aspects from Labor Tempelhof can also be applied here. In addition, the report builds a bridge to all industrial and commercial sectors in which C2C innovation and sustainable alternatives can lead

to a circular economy that focuses on quality. The production of the first major events, which not only emit less CO<sub>2</sub> than conventional events, but also show a different way of dealing with finite resources, creates a flagship project that can serve as a model – for the entire event industry and far beyond.

The process and the results of the project – successes and hurdles – are transparently recorded in a comprehensive guidebook that covers all participating trades and business actors. In cooperation with the **Boston Consulting Group**, the impact measurement was conducted to ensure that the effects of implemented measures in the form of saved CO<sub>2</sub> emissions, reduced waste generation due to recyclability, positive social effects, or higher material health are visible and scalable. The guidebook was written in cooperation with the think-and-do-tank

and policy consultancy **adelphi**. It enables the pioneering work of Labor Tempelhof to be duplicated and scaled. Simultaneously, the guidebook identifies areas of potential innovation at a product and process level as well as missing framework conditions that have thus far made scaling processes more difficult or have completely prevented them from happening. The conclusions are described in this report, and the recommendations for industry and politics are derived from it. Other project components of Labor Tempelhof include a transformation platform through which networking can be carried out and experiences and ideas can be exchanged in order to advance the transformation of society as a whole towards circular business and action, as well as a C2C exhibition and event series in Berlin until 2024, which is funded by the Foundation 'Deutsche Klassenlotterie' in Berlin.



## 1.2 CRADLE TO CRADLE & CIRCULARITY

More than ten years ago, the Stockholm Resilience Centre defined nine planetary boundaries. If we exceed them, the survival of humanity on earth is acutely endangered. With climate change, the integrity of the biosphere, biogeochemical cycles, the change of land systems and novel substances such as plastic, we have gradually passed five of the so-called critical “tipping points”. Recently, the planetary limit for freshwater has also been exceeded.<sup>2</sup>

We humans have changed these systems to such an extent that it is no longer sufficient to burden them only slightly less in the future. In order to solve the problems of our time on a lasting basis, the climate and resource crisis must be seen as a combined challenge, taking into account that environmental, economic and social problems are interrelated. Emitting less CO<sub>2</sub> into the atmosphere, causing less waste, or wasting fewer finite resources slows down the resulting problems, but it does not solve them. Above all, at the global level, the strategy of renunciation and reduction is not sufficient given a growing world population and widely differing levels of prosperity. Here, a new way of thinking is needed that goes hand in hand with positive goals: we humans can be “beneficial” beings who leave a positive footprint behind. The earth must not only be preserved, but also promoted, as it is the basis of all living beings' livelihoods. This requires holistic solutions to the complex problems of our time.

Political and economic incentives and frameworks must be redirected to enable and accelerate the necessary transformation from a linear to a circular economy. This framework must ensure that our actions

always achieve economic, ecological, and social added value. All resources taken from the biosphere must either be recyclable into the biosphere or circulate endlessly in the technosphere. Value creation must be defined as long-term, holistic, added value.

The precondition for a circular and socio-economic transformation are products that are suitable for these cycles. Circularity is only achieved when products are already designed in such a way that their materials circulate in the biosphere or in the technosphere and can repeatedly become beneficial nutrients for something new. The decisive factor here is that these products are designed for their specific use scenario. When components of a product enter the environment, they must be suitable for the biosphere and, thus, be compostable. If not, the product must be able to circulate in the technosphere. When selecting materials, material health is crucial: products should only consist of suitable components that do not have a harmful effect on humans and the environment in the respective use scenario of a product. Energy for this closed-loop economy comes from renewable sources and is generated in facilities whose building materials are fully recyclable. Economic processes do not pollute water and ideally build up fertile soils. CO<sub>2</sub> does not end up in the atmosphere as a greenhouse gas, but is used as a resource. Working conditions are social and fair.

C2C, as a holistic approach, incorporates all of this into three pillars: rethinking, redirecting, and reshaping our economy. Furthermore, it forms the methodological basis for creating solutions that enable a prosperous economy within the planetary boundaries.

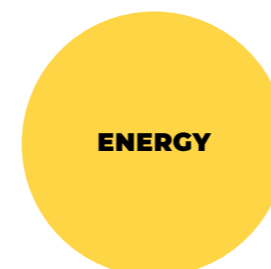
## 1.3 POLICY FRAMEWORK AND EIGHT POLICY THESES

A circular economy according to C2C requires the right regulatory framework. The Circular Economy Action Plan (CEAP), within the framework of the European Green Deal, focuses on a European circular economy, and the German government also describes this goal in its coalition agreement. So far, however, the standards and objectives have not been set strictly enough to bring about real change. Subsidies still flow into linear and non-renewable industries and many necessary transformation processes rely on the voluntary participation of relevant stakeholders instead of setting

the right incentives or making them mandatory responsibilities. Chapter 3 of this report therefore describes in detail which political levers are needed in the areas of mobility & logistics; energy; nutrients, food & agriculture; water, buildings & construction; textiles; plastics & packaging, as well as digitalization, and where there is still a need for action. Eight policy theses can be derived from all of this and serve both as a call to action and resource for politicians so that they can push for change now in order to pave the way for a circular economy according to C2C:



Sustainable mobility and logistics concepts are core elements of circular change. Sharing models, the expansion of public transport, and bicycle infrastructure are just as much a part of real change in mobility as the question of sustainable propulsion technologies and fuels. Global freight transport is the biggest challenge.



The framework conditions for the development of energy supply are clearly formulated: 100 % renewable energies by 2050. An energy transition with long-term positive effects requires not only a rapid expansion of renewable energy sources, but also incentives for circular and recyclable facilities for the production of energy.



**NUTRIENTS,  
FOOD &  
AGRICULTURE**

Nutrient-rich soils ensure food security for an increasing world population. Therefore, renewable agriculture must be promoted to build up soils and improve their function as carbon sinks. Closed material cycles must also include the recovery of important resources such as phosphorus from sewage treatment plants or carbon from the atmosphere. They are nutrients for soils or materials such as plastics, which we have so far simply wasted.



**WATER**

In order to meet the challenges of climate change, water must be kept clean and used sustainably without compromising public availability. Water is the most widely used resource in the world, so only circular use will meet the future requirements for the effectiveness and efficiency of water availability and use.



**CONSTRUCTION**

In the construction sector, a high level of reuse and recycling of building materials must be achieved in order to put an end to the waste of resources and the generation of waste in the sector in the long term. This requires clearly defined quality criteria for all building materials that promote material health and circulation in the technosphere across the entire industry.



**TEXTILES**

The textile and clothing industry must set ambitious targets for the health of materials and the recyclability of its products in order to meet its responsibilities under the polluter pays principle. At the level of business models, there is a need to incentivize retrieval systems and solutions for the collection, sorting, and recycling of used clothing. Digital solutions must also be promoted to ensure transparency in supply chains and materials.



**PLASTICS &  
PACKAGING**

Plastics will remain necessary in the foreseeable future, especially in the packaging industry. This makes incentives for plastics, which – depending on the usage scenario – are capable of circulating in the biosphere or technosphere without being harmful to humans and the environment, all the more important. Additionally, the era of virgin plastics being the more economical option to produce plastics or packaging that are harmful to the environment and our health must come to a clear end. Lastly, a clearly defined quality criteria for future recyclable plastics is needed.



**DIGITALIZATION**

Only digital and transparent processes enable a closed circular economy according to Cradle to Cradle. It is only possible to actually close material loops if the quality and quantity of each ingredient or material is known for each product, how products are used or installed, under what circumstances they were manufactured, and how a return to the respective cycle can be ensured.

## 2. OPTIMAL SITUATION, CONVENTIONAL EVENTS AND THE LABOR TEMPELHOF

In this chapter, different subject areas are examined for which C2C solutions have been implemented or sought in the project Labor Tempelhof. According to a general description, the report sketches an optimal idea according to C2C, discusses conventional implementation at major events, and then outlines implementation at Labor Tempelhof and the scalability of such innovative solutions. The areas, products, and processes are to be understood as

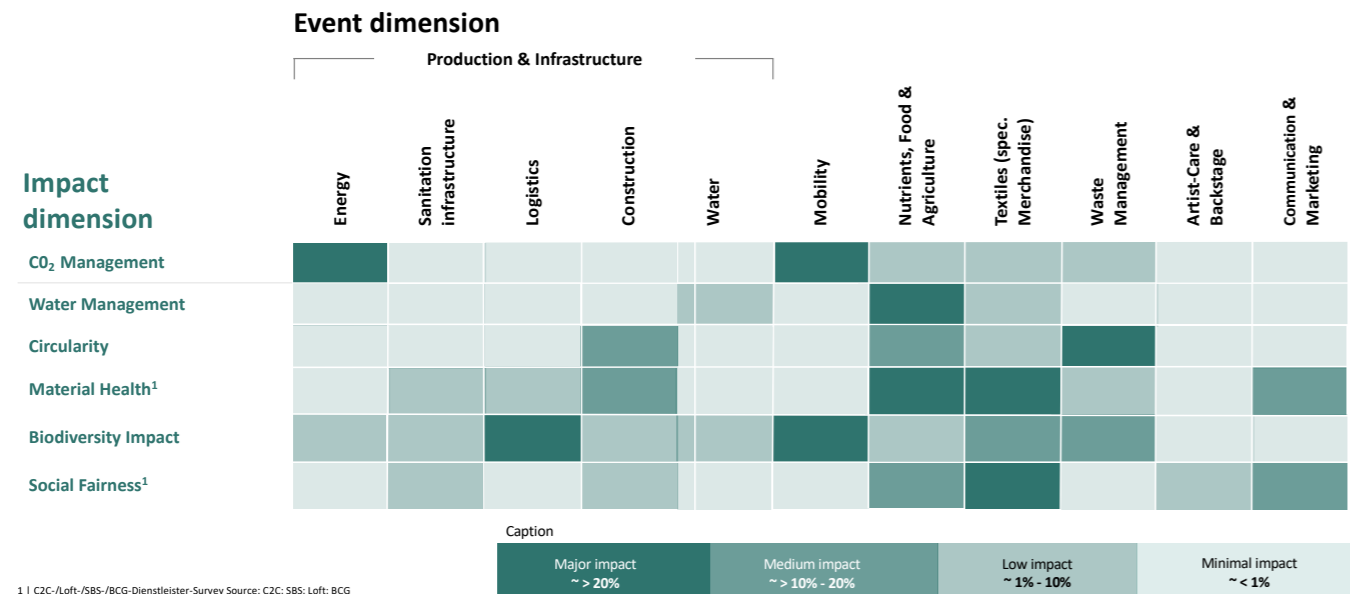
examples. All C2C innovations or ecological alternatives, as well as material flows implemented and tested at Labor Tempelhof, are described in detail in a guidebook for the event industry, and the resulting added value is quantified.



<https://labor-tempelhof.org/projektbausteine/guidebook-veranstaltungsbranche/>

### Impact Matrix | Overview of dimensions helps event organizers prioritize initiatives

Overview of the causative event dimensions and their relative influence on the impact dimensions. Support for prioritizing initiatives by event dimension.



<sup>1</sup> | C2C-/Loft-/SBS-/BCG-Dienstleister-Survey Source: C2C; SBS; Loft; BCG

## 2.1 MOBILITY & LOGISTICS

### CLASSIFICATION

Mobility and logistics are fast-growing sectors worldwide. This has **an impact on rising CO<sub>2</sub> emissions as well as other environmental impacts**.<sup>3</sup> Sustainable mobility and logistics concepts in accordance with C2C as a circular principle can mitigate these effects, minimize costs in the long term, and increase effectiveness, efficiency, and participation.<sup>4</sup>

In the event sector, attention is primarily paid to providing visitors with a coherent overall

experience through a unique stage design, the appearance of interregional or international bands, an interesting location, as well as a large selection of gastronomic offers and merchandise. All of these people and goods have to arrive at the event site. This leads to high mobility and logistics costs and, consequently, to enormous environmental pollution. According to a British study, the transport of the visitors alone accounts for up to 80 % of the carbon footprint of a musical tour.<sup>5</sup> The potential leverage effects of circularity in the mobility and logistics sector are evident.

### OPTIMAL SITUATION

Mobility & logistics in line with circular economy principles that create added value is closely linked to the levers described in Chapter 2.2 for an energy and electricity sector that must be based on renewable energy from recyclable generation facilities and recyclable storage facilities. Goods transported by electrically-operated commercial vehicles or passengers transported by sharing models, in which electric vehicles are used are, of course, preferable to mobility and logistics based on combustion technologies. However, in order for electromobility to become part of a circular economy according to C2C, all components of a vehicle must be designed for reuse and recycling. In addition to the chassis, the interior, and electronic components, this also applies to all powertrain components and the batteries. Since this is not the case today, alternative transport options besides individual mobility can, above all, contribute to bringing people to an event in a way that is as climate- and resource-friendly as possible.

These alternatives include cooperations with national or local railway operators to motivate participants in advance to utilize public transport by means of discounts. In order to make the option of cycling more attractive, event locations should provide sufficiently safe bicycle parking spaces and inform visitors in advance. Other possibilities include the event organizers creating digital platforms where participants can offer and or benefit from carpooling. To completely dissuade participants from traveling individually by car requires easily accessible alternatives or the absence of infrastructure for individual transport. For example, only making car parking spaces accessible to people with disabilities sends a clear signal to participants.

Goods such as stage elements or even food can, in principle, be transported by rail to the vicinity of a venue. The last mile can then be completed with electrically-powered commercial vehicles. While electric vehicles have not yet become widely accepted in the case of large commercial vehicles due to the higher costs compared to commercial vehicles with combustion engines<sup>6</sup>, they are customary on the market in inner-city logistics. Additionally, reverse logistics can prevent unnecessary travel distances and empty vehicles and serve the purpose of efficiently returning goods to the supply chain. By cooperating, for example, with businesses adjacent to the venue, other goods can be taken along and transported by third parties after unloading delivered goods for an event.

### CONVENTIONAL EVENTS

Due to cost pressure, event organizers, generally speaking, focus on convenience and simplicity when factoring in mobility and logistics needs: short arrival and delivery times as well as widely-available and cost-effective options in freight and passenger transport. Since, at least in the logistics

sector, the conventionally used means of transport are usually operated by internal combustion engines, this has a detrimental impact on the environment. In passenger transport, on the other hand, an increasing focus is already being placed on getting people to and from events via public transport or shuttle services.

## LABOR TEMPELHOF

At Labor Tempelhof, visitors can easily get to the venue in the heart of Berlin, which is accessible via metro train stations in the immediate vicinity. The ticket price includes a public transport ticket for the respective concert day. In order to additionally distribute the type of travel to different mobility options, a mobility station is set up in order to support vehicle sharing offers at bus stops and train stations. For bands and crew, a no-fly policy applies for the four concerts; they travel by train and/or electric shuttles.

The planning of the concerts was also based on synergy effects: by combining four concerts from two bands at the same site with the same structure fewer logistical steps were needed to create the same result. In order to make the transport of goods on the concert grounds more sustainable, a proportioned number of electric forklifts and cargo bikes are rented and used on site.

### TRANSFER TO OTHER SECTORS

The offers implemented at Labor Tempelhof can promote the climate and resource-saving transport of people and goods in any industry, as well as in an urban context. Rail travel, public transport, the cost-effective leasing of bicycles, electric bicycles, or sharing models with electric cars can

contribute to carbon neutral mobility structures. However, a holistic mobility turnaround also includes circular logistics concepts without empty loads, vehicles and vehicle components that are designed for reuse and recycling, and alternative engines for commercial vehicles.

## 2.2 ENERGY

### CLASSIFICATION

**In Germany, the energy and electricity industries accounted for around 36.5 % of CO<sub>2</sub> emissions in 2020.<sup>7</sup> Worldwide, the share is around 75 %.<sup>8</sup>** The development of renewable energies has been shown

to contribute to reducing greenhouse gas emissions from energy production. Energy-related emissions of all greenhouse gasses decreased by around 39 % between 1990 and 2021. Emissions from fuels fell by 82 % over the same period.<sup>9</sup>



After the emissions associated with the arrival and departure of participants and the transport of goods and infrastructure, the operation of events is itself the second largest emitter of greenhouse gasses. At events, a large number of technical devices, such as sound or lighting systems, must be supplied with energy. In addition, there is the electricity demand

of the existing commercial facilities and the surrounding infrastructure. The provision takes place via existing grid connection and, predominantly, with the help of decentralized power generation facilities such as Diesel generators. The performance peaks are irregular in terms of time and size, which causes regulatory restrictions in grid stability.

## OPTIMAL SITUATION

The goal of a truly circular economy is, first of all, a 100 % renewable energy supply, which is generated in recyclable facilities. This can be achieved in the case of large-scale events via electricity purchase contracts with an energy supplier that only uses circuit-capable solar panels or wind turbines. Although C2C-certified solar panels are available on the market, the initiators are not aware of any energy provider who can provide energy production with circular panels. An alternative is energy generation with recyclable solar panels on site in combination with battery storage systems. In an ideal situation, these storage systems are also designed to be recirculated and can be taken apart and separated into their individual components without compromising material integrity. Until now, such decentralized energy interconnection systems have only existed in designs with low-rated power, which is below the requirement of large-scale events.

If the use of generators cannot be avoided, various new developments in the Power-to-X range offer a possibility of operating these CO<sub>2</sub>-neutral systems. Synthetic fuels such as green hydrogen can be used. However, enormous losses in efficiency and larger infrastructure measures must be accepted in comparison with direct electricity use. Alternatively, some festivals have been relying on the use of biofuels for several years, but this, too, comes with its own caveats, as the large area required for biomass production is reflected in further environmental pressures, such as an increased loss of biodiversity.

Innovative concepts that enable participants to actively participate in the coverage of energy consumption are also interesting. Known as 'people-power facilities,' such as bicycle discos or dance floors, which convert kinetic energy into electrical energy, can be used to raise awareness of sustainability concepts.

## CONVENTIONAL OF EVENTS

In the case of an event without a suitable fixed current connection and corresponding outlets, electrical power is mainly provided by means of diesel generators. A UK study from 2020 found that social events in the UK consume an estimated 380 million liters of diesel annually, equivalent to about 1.2 million tons of CO<sub>2</sub> emissions.<sup>10</sup> The combustion of diesel fuel at these events is not only a driver of climate change, but also contributes to local air pollution.

Energy management at outdoor events is often inefficient. Since the energy requirement is not precisely known in advance of the event due to the lack of data, more powerful generators are often used than are actually necessary. In addition, light and sound systems, especially for smaller events,

are not designed according to modern efficiency standards, due to their long service life and multiple reuse over various events. This is an obstacle for event technology rental companies that want to switch to more efficient technical equipment, which means, above all, high acquisition costs. However, the aspect of gray energy, i.e., the indirect energy demand for the production of a new product, must also be taken into account here.

In the event context, solutions such as LED light and screens with a lower power consumption are already being used for efficient and environmentally-friendly power management. However, there are few to no solutions on the market in this area that meet C2C criteria.

## LABOR TEMPELHOF

Labor Tempelhof uses 100 % renewable green electricity from Berlin's municipal utilities through a fixed current connection for the environmentally-friendly electricity management of the stage and all the structures on site, such as food and beverage stalls. An alternative to the use of conventional diesel fuel was sought for devices that must be operated autonomously for safety reasons. Therefore, the light posts are operated with HVO fuel from hydrogenated vegetable oil. This is a lower-emission alternative to conventional diesel and a transitional solution until recyclable batteries can be used for this purpose. There is also a solar-powered "charging tree" for charging smartphones.

### TRANSFER TO OTHER SECTORS

In terms of energy supply, the event industry faces greater challenges than most other industries, as concerts and festivals are often linked to geographic mobility. Energy-efficient generators powered by alternative fuels such as HVO can be used as transitional solutions until a full supply of renewable energy from recyclable plants is possible. However, mobile charging stations made of solar energy or “people power” are solutions that can

already be used today in other areas of public space (trade fairs, markets, public places). The expansion of renewable energies from recyclable facilities is a basis for promoting the transition to 100 % green electricity in event locations with a fixed current connection and, at the same time, achieving a sustainable energy transition. Together with circular storage options, this expansion offers the greatest leverage for the successful implementation of a circular economy.

## 2.3 NUTRIENTS, FOOD & AGRICULTURE

### CLASSIFICATION

**Most agricultural entities follow a linear production approach, in which resources are not sufficiently recycled and the environment is heavily polluted by increased greenhouse gas emissions, the use of harmful chemicals, groundwater nitrates, and the burning of carbon.**<sup>11</sup> One third of global emissions are attributed to the food sector.<sup>12</sup> In order to have a resilient ecosystem available in the future, a regenerative agriculture system is

necessary: one in which holistic nutrient management helps to close disturbed nutrient, water, and carbon cycles.<sup>13</sup>

At events, participants are accustomed to a large, usually meat-heavy culinary offer. Organizers can influence the conscious selection of food, the reduction or, ideally, the complete avoidance of waste, and the recycling of food residues through a suitable disposal or nutrient concept.

### OPTIMAL SITUATION

A catering and supply offer in line with a circular economy according to C2C begins with the selection of food that comes from a regenerative agriculture system. Since transport routes cannot yet be mapped in a climate-neutral manner, regional suppliers should be preferred. In addition, plant-based supply can reduce climate impacts, as more than half of all greenhouse gas emissions from agriculture are methane emissions from livestock farming.<sup>14</sup> In order to minimize the waste of food, holistic preparation principles, such as the “from leaf to root”<sup>15</sup> system or “farm to table” concepts, should be taken into account, in which all edible parts of an animal or plant are used. In addition, food waste can be prevented by more targeted planning of per capita demand, as this allows the overall food demand to be better calculated. Specific disposal options should also be available for all nutrients to be separated, both in the artists’ and the visitors’ areas, in order to ensure the recycling of as much raw material as possible.

### CONVENTIONAL EVENTS

Most events focus on meat-heavy cuisine. Often, these offers consist of fast-food, which is delivered ready-to-cook or even ready-to-eat. Burgers and frozen fries are typical examples. This means that a large number of people can be taken care of in a short time, which is especially important for large events or festivals. In addition to the factor

of time, the personnel costs in the catering sector are significantly lower than options requiring fresh preparation. Since most events do not offer visitors any options for separating waste, the system loses valuable nutrients from food residues in residual waste. Gastronomic catering companies often rely on the separate disposal of food residues and the separate collection of used fat.

At Labor Tempelhof, measures are mainly taken on the overarching topics of catering and gastronomy, as well as disposal. Bands and crew are supplied with purely vegan-vegetarian food in the backstage area. For fans, the catering company was instructed to offer 70 % vegetarian and vegan food. This offer is rounded off by smaller providers with circular products and business models. One example is a beer vendor that saves organic bread from being thrown away and instead utilizes it to brew its beer. A reusable solution for dishes for all food stands is not feasible for logistic and cost reasons. For this reason, compostable, disposable dishes are used at Labor Tempelhof. The disposal and waste separation system helps to ensure that sufficient preparatory work is done before entry, on the grounds, and behind the scenes, so that nutrients can be properly recycled later.

At Labor Tempelhof, agricultural nutrients are also recovered from the sanitation facilities. For example, portable toilets, whose solid contents can be composted into nutrient-rich humus and used in agriculture, are a circular alternative. From separately collected urine, phosphorus is also recovered, which is processed into liquid fertilizer as part of a research project.

**TRANSPORT TO OTHER SECTORS**

Not only in the event industry, but also in canteens, dining rooms, schools and universities, or breakfast buffets in hotels, a circular gastronomy concept and disposal system for the maximum recycling of resources and nutrients are important. The circulation and recovery of nutrients from human excrement can also be incorporated into urban and construction planning activities through

integrated systems, which has great scaling potential. Phosphorus and humus contribute to the development of healthy soils as a basis for the food security of an increasing world population, with phosphorus now being imported into Europe from declining deposits. The recovery of human excrement is therefore not only ecologically, but also economically, a smart plan.

2.4 WATER

**CLASSIFICATION**

**Worldwide, water scarcity is already high or extremely high in around 80 countries,<sup>16</sup> and around 80 % of global wastewater is discharged into the environment untreated.<sup>17</sup>** This is not only a heavy environmental burden, but it also illustrates that the potential of the circular economy in

terms of water is still underutilized.<sup>18</sup>

In the event sector, water is fundamental to almost all services. Water is occasionally provided as drinking water, used in sanitation facilities, or used for the preparation and cooling of food and beverages.

OPTIMAL SITUATION

A circular approach to water means using this resource instead of consuming it. Decentralized water stations, where participants can refill reusable containers, as well as the collection and reuse of used water, can contribute to this concept at events. At the same time, mismanagement and water waste need to be minimized, for instance, by automatic start-stop sensors in the catering areas, water stops in cisterns in the sanitation facilities, or water aerators in all taps. Rainwater can be collected in addition to gray-water (slightly polluted but feces-free water) from washbasins and jointly treated and reused in further water utilization cycles, like to flush toilets. In order to support wastewater treatment, environmentally-friendly cleaning agents and dishwashing detergents should be used in the sanitation facilities and the catering areas.

**CONVENTIONAL EVENTS**

In the sanitation facilities, water-based toilets, as well as water and shower taps with manual rotary shutters, are generally used, which contribute to the waste of water. Soaps, cleaning agents, and dishwashing detergents are generally not biodegradable and are therefore a burden for the sewage

system, and in the worst case, for soils and groundwater at the venue as well. Water management also has potential for improvement in terms of social aspects at most events. While some major festivals already provide free tap water for visitors, this is usually not yet the case for one-day events.

## LABOR TEMPELHOF

In order to reduce the use of water in sanitation areas, water flushed toilets at Labor Tempelhof are supplemented with dry/composting toilets. They do not use water during operation. Additionally, the feces and urine collected separately in these toilets is processed by the supplier company as part of a research project into humus and liquid fertilizers. The chemical toilets are re-routed to a sewage treatment plant, in which phosphorus is recovered from sewage sludge ash and processed into a liquid fertilizer as well. Furthermore, gray-water is collected in washbasins and made usable for at least one further cycle with the aid of osmosis filters, if the technically required amount of gray-water for the osmosis filters to work properly is reached. Free drinking water is available on site for visitors at drinking water stations. In the backstage area of Die Ärzte, the band and the tour crew use refillable water bottles and water dispensers.

### TRANSFER TO OTHER SECTORS

In addition to festivals and concerts, a circular approach to water use can also be applied in a comparable manner to trade fairs, municipalities in urban development, and commercial areas. Optimized gray-water management in buildings of all kinds is a central approach to circular water utilization in the

municipal sector. The energy sector is the largest water consumer in Germany, followed by mining and trade, public water supply, and agriculture.<sup>19</sup> In these areas, it is essential to keep water in cycles, that is to say, to use it instead of consuming it and to ensure the purity of the water.

**sector accounts for 35 % of energy consumption and around 30 % of total CO2 emissions in Germany.**<sup>22</sup> Compliance with the principles of a circular economy in the construction of buildings and structures aims to solve these problems in the long term.

At large events, structural infrastructure includes

stages, stage superstructures, barriers, platforms, ground protection devices, sales and exhibition stands, tent superstructures, and various design elements. Sound and lighting systems, LED

screens, and mixing consoles can also be counted as construction projects. In addition, event buildings must be maintained, renovated or, although rarely, newly built.

## OPTIMAL SITUATION

For a circular economy according to C2C, any construction should begin with the circular design of building materials and their utilization in a specific usage scenario. Event buildings are products whose components should circulate within technical cycles. They are then modularly constructed, easy to disassemble, and can be reused at subsequent events completely or in slightly modified forms with the same construction elements. When an element is no longer functional, the materials used for its operation can easily be returned to the technical material cycle and recycled without loss of quality. Components are ideally offered via circular business models. They are not sold, but are provided by the offering company or third parties via rental or product service models to the users for a certain period of time. These business models support the return of construction elements, which are designed and built for circularity, into closed cycles via take-back systems.

### CONVENTIONAL EVENTS

Since construction elements are often used only temporarily and must meet the same requirements for different event formats, repeated reuse is common. In principle, stages and other temporary superstructures are optimized for disassembly and designed in a modular manner. However, these requirements often lead to reductions in quality during recycling. Plates used for floor surfaces are

often made of composite materials. Their individual components are glued to one another or coated and, therefore, cannot be separated or can only be separated with difficulty and the loss of quality regarding the individual materials. Circularity is therefore not possible. Circular solutions that simultaneously meet safety and functional requirements have not yet become the norm in the event sector.

## 2.5 CONSTRUCTION

### CLASSIFICATION

Construction is one of the world's most resource- and waste-intensive economic sectors. **In Germany, this sector accounts for 54.7 % of total annual waste generation.**<sup>20</sup> In addition, 517 million tons of mineral raw materials are used annually. This corresponds to 90 % of the total domestic extraction.<sup>21</sup> **At the same time, the construction**

At Labor Tempelhof, the aim was C2C-certified or -inspired solutions for construction elements in order to demonstrate material-healthy and recyclable solutions. One example is the prototype of a stage/podium in the Cradle Village, where multiple C2C innovations are shown clustered together on the concert grounds. The prototype uses a wood-based composite material and fire-galvanized steel, both of which can circulate in a technical cycle. The materials are installed in such a way that they can be separated again without waste. The wood panels consist of 75 % natural fibers from sawdust from regional sawmill industries. After use, the manufacturer takes back the material and continues to recycle it. Due to the hot-galvanizing process, the steel is corrosion-resistant and therefore durable. In its production, up to 80 % less zinc is used, and heat exchanger systems for recovering process heat are used. The zinc is completely recyclable without loss of quality. The stands for the information concept, which explained the C2C-inspired innovations on site to the concert audience, were also designed to be recyclable, as well as the posters for the disposal concept on the concert grounds.

### TRANSFER TO OTHER SECTORS

The intended use of C2C building materials at Labor Tempelhof, as well as the ability of these materials to be dismantled after use, can be applied to all construction projects. Labor Tempelhof illustrates that C2C-inspired construction can also be implemented in areas with specific safety and functional requirements such as electricity and fire protection. Materials that can be dismantled,

or the use of consumables that circulate in the biosphere, can also contribute to transforming the construction industry across the event branch. Scaling the prototypes tested at Labor Tempelhof makes economic sense, above all, when the real price of raw materials is mapped on the market and circular business models accelerate the circulation of finite resources.

## 2.6 TEXTILES

### CLASSIFICATION

The textile industry is one of the most polluting and resource intensive industries in the world. European textile consumption ranks fourth in terms of its negative impact on the environment and climate change, after food, housing, and mobility. In terms of water consumption and land use, it ranks third, and fifth in terms of the use of primary raw materials.<sup>23</sup> **Every year, 92 million tons of textiles end up in landfills worldwide.**<sup>24</sup> Moreover, the global textile industry is the sector with the **highest risk of child and forced labor, inadequate occupational health and safety, and the violation of minimum wages.**<sup>25</sup>

The textile industry strives for improvements through more efficient production technologies and the reduction of environmental influences of the materials used. So far, however, the sector has only aimed at reducing the negative effects of today's linear textile production. Real change, though, can only be

achieved through a regenerative, circular economy that aims to strengthen ecosystems and creates economic, ecological, and social added value. In a circular textile industry, textiles are created in such a way that their components do not cause any damage to the environment or our health, neither during production nor during consumption. Based on a Cradle to Cradle inspired design of products and processes, a circular textile industry would automatically lead to added value along the entire supply chain. This, in turn, enables all companies in the value chain to ensure fair wages and fair working conditions.<sup>26</sup>

Within the event industry, textiles play a role on-stage and behind-stage in the form of merchandise T-shirts or the backstage staff's clothing. Textiles are also used for stage construction, as furniture and decorative fabrics at seated events, and for backstage furniture as well as curtain fabrics, flags, or other textile-based information banners.

For the use of textiles at events according to C2C, they must be designed for circularity and be material-healthy. Around 35 % of the global input of micro-plastics from primary sources is accounted for by synthetic textile fibers, which dissolve out of the fabrics during production and during washing cycles.<sup>27</sup> Textiles should therefore be made to be able to circulate in biological cycles without damage to the environment. Another important aspect is that textiles should only consist of materials that are suitable for skin contact. Accordingly, in the case of textiles made from renewable raw materials such as cotton fabrics, the yarn, the material dyes and other finishes must also be biodegradable. The same applies to textiles made of synthetic materials. It must also be ensured that any fiber abrasion which may occur during washing can also circulate in the biosphere.

### CONVENTIONAL EVENTS

In the case of merchandise T-shirts, it is customary for artists and bands to sell specifically dated T-shirts for each tour. Since the emotional value is in the foreground when buying, the sales volume of a fan shirt depends primarily on the popularity of the band and the design of the shirt. Demand for quality, material health, and recyclability generally receive little attention. This is due, inter alia, to an allegedly higher price for textiles that meet these requirements.

For events or series of events, a specially produced set of crew shirts is occasionally provided to equip the backstage staff. Other textile products, such as furniture and decorative fabrics, often fulfill a functional role, sometimes with special technical requirements. They, too, usually receive little attention in terms of sustainability, and decisions are usually made in a price-oriented manner.

### LABOR TEMPELHOF

At Labor Tempelhof, some of the merchandise T-shirts from the bands Die Ärzte and Die Toten Hosen, as well as the T-shirts of the C2C ambassadors, are produced according to C2C standards. They consist of recyclable fabric, which is printed with biodegradable textile ink and treated with environmentally friendly fixing agents. In addition, production took a lot of care in using textile materials optimized for circulation wherever possible. Furthermore, an exemplary Molton fabric is exhibited that meets the fire protection requirements of events and is recyclable. In the backstage area, an armchair covered with C2C fabric is showcased.

### TRANSFER TO OTHER SECTORS

There are already numerous manufacturers on the market who produce fabrics, yarns, and entire textiles according to C2C criteria. Both in the field of utility textiles as well as for leisure and work clothes. Fabrics for technical textiles can be used in the automobile or aircraft industry. Workwear that meets C2C criteria can be procured for all areas in which larger groups of personnel or service providers are regularly equipped with work clothes.

In the private sector, this applies, for example, to the catering industry, the tourism industry, and the trade fair business. In the (semi-) public sector, this applies to healthcare, public transport, or the equipment of public authorities. Especially in the case of workwear, product service models, which promote economic circulation of textiles, are also conceivable. The equipment, for example, from service providers for a single event, can be borrowed instead of bought.

## 2.7 PLASTICS & PACKAGING

### CLASSIFICATION

**Plastic waste pollution is one of the biggest environmental problems of our time.**<sup>28</sup> In today's prevailing linear economic system, the life of a plastic product often ends after its first use. Packaging materials, in particular, can often neither be reused nor recycled because of the use of composite materials which cannot be separated or can only be separated with difficulty, often consisting of poorer quality of individual components or non-reversible material compounds.

At events, plastics and packaging are ubiquitous, especially in the catering industry. In addition to packaging waste, in particular, in the case of festivals lasting several days, waste is produced by objects and their packaging that is brought to the event. The event industry, especially in the catering sector, has a great deal of leverage to reduce packaging waste and to make packaging recyclable. There are also several promising approaches for less easily regulated waste streams, such as when it comes to items brought in by participants. **CONVENTIONAL**

## OPTIMAL SITUATION

When planning the set-up of the event, it should be ensured that, in line with a circular economy according to C2C, the event equipment is delivered in reusable or compostable packaging. Circular, reusable solutions, such as packaging boxes for the transport of food, are already available on the market in C2C quality. In the case of plastics used for stages or other superstructures, it must at least be ensured that they do not contain harmful substances like PVC. In gastronomy, reusable solutions with a return system must be standard. If reusable solutions cannot be implemented, compostable, disposable dishes can be used as alternatives. These can still be composted at the venue to avoid negative environmental impacts from unnecessary transport. If plastic products are used in production or catering, it should be ensured that they are made of completely recyclable mono-material. In general, visitors should be made aware of the topic of plastics and packaging in advance. For example, this can be done by being informed about collection systems for various valuable nutrients on the event site or, especially in the case of multi-day festivals, about packaging-free shopping opportunities on site. In this way, the audience can also help to keep various material flows in circulation. The problem of abandoned camping equipment at festivals can be solved by renting tents on site for a deposit and then returning them.

### CONVENTIONAL EVENTS

The plastic flood of packaging waste begins in the run-up to an event, when stage components or large containers are delivered wrapped in plastic films or protective materials. The event catering industry continues to rely on disposable tableware, even though it might no longer be made of conventional plastic as of the beginning of 2021. The beverage cups used continue to consist of plastic,

but many event organizers have already made use of hard plastic cups in a deposit system. In some cases, beverage cups are printed with event-specific motifs, which shortens their period of use in comparison with neutrally printed or unprinted cups. Plastic, whether generated by the event or brought along by participants, is often not treated as a recyclable material and collected accordingly, but disposed of as part of residual waste.

## LABOR TEMPELHOF

At Labor Tempelhof, the topic of plastics was optimized primarily through initiatives in the catering and gastronomy sector. In the case of materials for tent tarps, existing materials are used and reused. In this way, additional waste streams from products that are actually still functional were avoided, even if they do not meet C2C or other sustainability criteria. PVC-free material was procured for new purchases, such as part of the banners. There is a returnable solution with a deposit for beverage cups on the concert grounds. In addition, the production of a compostable french fry fork from a plastic alternative was initiated, the scaling of which is still being optimized. The other disposable dishes used at the concerts can also be composted. Furthermore, Labor Tempelhof relies on a holistic disposal system behind the scenes, as well as in front of the entrance and on the premises, which separates nutrient flows in such a way that they can be returned to their respective cycles at the end of the event. Visitors are made aware of the different material flows and the correct disposal of food residues or packaging through an information concept on site. In the backstage area, the separation of the waste into clear and colored glass, cardboard, plastics, residual waste, food residues and used fats creates a good basis for the majority of the nutrients to be able to be fed back into the corresponding loops.

### TRANSFER TO OTHER SECTORS

The use of plastics and packaging waste has global relevance for all sectors; the sensible use of recyclable and material-healthy packaging, sorted, separable, and recyclable plastics, the use of reusable systems, and the awareness of users are therefore generally valid and necessary levers. As a result, the amount of plastic waste from linear

production can be reduced and, at the same time, future-proof solutions for circular plastic products can be created. Individual solutions that have been implemented or initiated at Labor Tempelhof, such as compostable cutlery made from agricultural industry residues, can be scaled and then used in a wide range of applications.

## 2.8 DIGITALIZATION

### CLASSIFICATION

A circular economy according to C2C criteria can only work if all information about products, production processes, and delivery routes/current locations is known. **This ensures planning reliability and transparency and enables material and material cycles to be closed.**<sup>29</sup>

At events, digital processes can facilitate more climate- and resource-friendly planning. They range from the calculation of suitable food requirements per capita for the prevention of waste, to sensible logistics and mobility concepts for CO<sub>2</sub> emission reduction, to energy management during operation.

### OPTIMAL SITUATION

For a circular economy in line with C2C principles, it is necessary to know all the characteristics of all the products and materials used in order to guide material flows into cycles. Thanks to technologies already used in Industry 4.0, entire event sites can be displayed, processed, measured, and tracked as digital images (digital twins) of all relevant information about material quality and quantity. Digital product and material passports, which provide information about ingredients and the origin of products, help organizers, for example, in the selection of merchandise products. Apps make paper-based tickets superfluous and can also be used for sensible planning of mobility offers. Digital technologies can be used for all products and components used in event planning and implementation. They create transparency about the driving factors of the transition from a linear to a circular system, such as CO<sub>2</sub> emissions, material use, and energy consumption. Existing gaps on the path from linear to circular systems can thus be identified and targeted. Based on artificial intelligence, technological systems can give instructions, for example, on temperature regulation at the venue, the due date for replacing an old device, or maintenance requirements. The systems can even automatically regulate these factors.



Transparent supply chains are a core component of a circular economy according to C2C. They can be enabled by decentrally manageable and arbitrarily expandable data records (distributed ledgers, such as blockchain) or the tracking of KPIs (key performance indicators) via software. For closed circuits across all industries and sectors, such digital tools must be supplemented by the circularity component in addition to the conventional focus on cost reduction. This also applies to digital procurement, goods, and material storage logistics solutions.

### CONVENTIONAL EVENTS

Digital solutions that promote a circular economy have hardly ever been used in the event industry. Although digital tracking of economically circular activities is technically feasible, it is not yet an applied practice. Digital systems are mostly used by individual actors, such as suppliers, or as marketing tools, and less in the event organization itself. There are approaches to the digital mapping of holistic processes in logistics. The main focus is on recording and tracking delivery time, scope, and location. Aspects such as material health or recyclability

of products play, if at all, a subordinate role. Currently, there are hardly any reliable data sources that could be used as a basis to coordinate processes in the context of events and optimize them for their economic circularity. Not only products, but also the services offered at events, must be rethought in order to meet the requirements of an economically circular environment. A holistic view of the event industry also includes the planning and logistics activities of all goods, services, and products that are transported and offered for the implementation of events.



# 3. POLICY FRAMEWORK AND RECOMMENDATIONS

## 3.1 MOBILITY & LOGISTICS

With its **strategy for a climate-neutral Europe**, the EU has set<sup>31</sup> the goal of decarbonizing the European mobility system by 2050. The Federal Government's **Climate Protection Act**<sup>32</sup> stipulates that annual greenhouse gas emissions in the transport sector should fall from the current 160 million tons of CO<sub>2</sub> equivalents, to 95 tons, by 2030.

Traffic routes are to be shortened by changing infrastructure, and the utilization of vehicles is to be improved. It is important that this necessary transformation in the mobility sector is not only understood as being limited to a change in the types of engines that must be developed. Rather, in addition to new engine technologies, the entire understanding and concepts of personal mobility and individual vehicle ownership must be reconsidered. This can be accomplished by introducing incentives or subsidies for circular mobility concepts such as sharing models. Equally important is a targeted expansion of bicycle infrastructure, especially in urban areas. For a truly circular transformation in the mobility sector, the circular design of means of transport certainly plays a role. Equally important, however, are aspects such as the biodegradability of materials used for road markings so that they do not further contribute to the introduction of microparticles into bodies of water. **All of these aspects must be incorporated into relevant legislation.**

Moreover, engine redesign and circular innovation for batteries and electrical components must go hand in hand. An e-vehicle must not only contribute to the intelligent management of greenhouse gases during operation, but also during its production and after its use. This is only the case if its components, including its battery, are fully recyclable. Incentives for this concept can be achieved through appropriate **regulations to apply the polluter pays principle, but also through the promotion of voluntary recycling initiatives.**

In the realm of logistics, it is also important to **provide more incentives for freight transport by rail and to promote digital platforms for more effective management of the flow of goods in order to replace linear economic flows with a circular flow of goods.**

Today, technical devices in particular are not generally designed and produced according to C2C criteria. With complex core components like microchips, a circular design is currently only possible to a limited extent. **This makes it all the more important to provide incentives for circular business models in the relevant industries.** In the area of mobility & logistics, these incentives can be sharing models and product-service models for the industrial production of vehicles and their components.

### LABOR TEMPELHOF

The C2C T-shirts from the merchandise by Die Ärzte and Die Toten Hosen incorporate QR codes that contribute to increasing supply chain transparency, with regard to environmental aspects, but also social aspects along the value chains of the product components. This data is provided in the form of a material passport at Labor Tempelhof.

As a follow-up to the concerts, the project also plans to further collect, digitize, and evaluate the data of all materials used on the site and in production in order to create an overall balance of the four events as well as a product database. This sub-project depends on the availability and quality of the data required to carry it out. The digitization projects aim to provide transparency and, ideally, contain bundled information on the circularity, origin and use of materials, as well as on social fairness and material health.

### TRANSFER TO OTHER SECTORS

The availability of information and the proper handling of data play an essential role in the purchase, storage, and transport of raw materials and goods, in educating consumers, and in the development and implementation of new business models. All of these areas must be taken into account when shaping a circular economy and can be positively influenced by digitization. Ultimately, digitalization enables circulation because it is only when bundled information on all aspects of a product is available that full use of all raw materials in cycles is possible.

Cross-organizational information platforms can

promote the exchange of circular solutions and can be used across sectors. Such platforms may be publicly accessible or membership-based. Consumers can therefore have access to information and be actively involved in the transformation to a circular economy according to C2C through open source systems. The use of predictive data analysis and artificial intelligence enables energy and material savings. In many industries, this method is already in use today, but usually without integrating holistic quality aspects in line with C2C.<sup>30</sup> The use of distributed ledger technology, such as blockchain, enables companies to securely share information in international supply chains with their suppliers and customers.

## 3.2 ENERGY

Energy production and consumption account for more than 75% of global greenhouse gas emissions. The **European Green Deal** therefore aims to reduce net emissions by at least 55% below 1990 levels by 2030 and to achieve climate neutrality by 2050.<sup>33</sup> At the federal level, the **German Federal Climate Protection Act** stipulates that all greenhouse gas emissions are to be reduced by 65% by 2030 compared to 1990 and that greenhouse gas neutrality is to be achieved by 2045.<sup>34</sup> In addition, the amended **Renewable Energy Sources Act** stipulates that, by 2030, all energy generation should be “nearly greenhouse gas neutral”.<sup>35</sup>

However, the share of energy from renewable sources in the electricity generation mix does not yet say anything about its quality. Facilities for generating energy are mainly linear today. Composite materials are used, which make sorted separation and subsequent recycling difficult or impossible. The European Ecodesign Directive contains guidelines for the eco-design of energy-related products – including photovoltaic systems. The Directive is currently being revised in the framework of the CEAP<sup>36</sup> and will be extended to include aspects

of circularity. This revision must take into account concrete criteria for circular design, which are aimed not only at circularity but also at material health.

Furthermore, at the national level, circular business models for solar panels need to be promoted in order to drastically increase the current low proportion of recyclable photovoltaic systems on the grid.

Major events are an ideal place to test technologies for effective and efficient energy generation and electricity management. At present, sustainable energy management is implemented primarily on a voluntary basis. There are, indeed, isolated umbrella policies (ISO Standard ISO 20212<sup>37</sup>; Eco-Management and Audit Scheme, EMAS<sup>38</sup>), which also include event management; however, they are not institutionalized. Since electricity consumption and the associated emissions are relatively easy to measure, incentives in the form of bonuses or preferences can be provided for events with a CO<sub>2</sub>-positive power supply. Further sensible steps include a gradual capping of diesel fuel, leading up to a ban, as well as a binding minimum share for fixed or locally produced electricity from renewable energy sources.

## 3.3 NUTRIENTS, FOOD & AGRICULTURE

Guidelines for a more sustainable agricultural and food industry are included in the EU's **Green Deal**.<sup>39</sup> Among other things, the **Fit-for-55 climate package**<sup>40</sup>, the promotion of **carbon farming**<sup>41</sup> and the planning of an **internal market for the capture, use, and storage of CO<sub>2</sub>** address this

issue politically.<sup>42</sup> Commitments relating to the food industry, such as **EU Regulation (EC) No 834/2007**, which lays down the requirements of organic production in Europe,<sup>43</sup> the **Action Plan for organic production in the EU**,<sup>44</sup> and the **Farm to Fork Strategy**,<sup>45</sup> are intended to pave the way

for a fair, healthy, and environmentally conscious food system with less harmful pesticides, reduced nutrient losses, and reduced sales of antimicrobials for livestock and aquaculture.

However, the EU's **Circular Economy Action Plan (CEAP)** does not cover agriculture and food. This is a great opportunity for the EU, since the framework conditions for the agricultural sector are decoupled from measures for all other sectors. A holistic circular economy is only created if material flows between industry and agriculture are also closed. This applies, for example, to the industrial recovery of phosphorus from human excreta, which can be used as a basis for fertilizers in agriculture. This concept<sup>46</sup> has been allowed since the revision of the EU Fertilizer Regulation 2019, which harmonized the requirements for fertilizers produced from organic or secondary raw materials in the EU. However, this must also be accompanied by appropriate framework conditions for the industrial and scalable recovery of nutrients from waste or human excreta. This requires harmonization of the EU's agricultural policy with the CEAP. Both sectors must also be involved in the development of a management system for climate-damaging greenhouse gases.

The fact that the use of soil humus is prohibited if it is obtained from sterilized human feces contradicts the political goal of a circular economy. Appropriate field trials with special permits have shown that sterilization is possible before application as humus fertilizer.<sup>47</sup> Harmonization with the EU Waste Directive is necessary here. It has so far declared that human feces that are not mixed with water are waste. As a rule, they therefore end up in waste incineration. In order to end this practice

and other waste of valuable resources, the framework needs to be created to close agricultural and industrial material cycles and to enable genuine nutrient management.

Livestock farming occupies a large part of the world's land used for agricultural purposes. Pasture and land used for animal feed accounts for almost 80 % of the utilized agricultural area.<sup>48</sup> The United Nations expects the world population to rise to around 11 billion by 2100. In view of this, the displacement of agricultural land for food production by feed production is not sustainable. In order to counteract this, the allocation of EU agricultural subsidies must be substantially adjusted. Agricultural subsidies account for around 40% of the EU budget. A large part of these subsidies is still spent on direct payments, the amount of which is based on the area of a farm.<sup>49</sup> Instead of subsidizing quality in the sense of a regenerative agriculture that promotes healthy soils and biodiversity, size and quantity are the determining factors for where the money flows. The development of healthy and nutrient-rich soils, which will not only ensure the food security of 11 billion people in the future, but will also act as carbon sinks, must not be considered and regulated separately from the political goal of a circular economy.

In the context of events, accurate planning of attendance at events can prevent food waste. In particular, audits or requirements to demonstrate planned measures to reduce food waste could be introduced by organizers as part of the event approval process. Approval procedures can also stipulate how nutrients accumulating on the event site are to be handled.

## 3.4 WATER

The **CEAP** refers to the European **Drinking Water Directive**<sup>50</sup>, the amendment of which must be implemented by the EU Member States by 2023. Among other goals, it aims to make drinking water accessible in public spaces. In addition, more research into the measurement of microplastics in water and natural solutions for wastewater treatment will be promoted.<sup>51</sup> The new **EU regulation on water reuse will also apply in the EU** Member States and will go into effect in June 2023.<sup>52</sup> The **European Water Framework Directive** aims to bring existing surface water bodies into a "good quality" state in three cycles, at the latest by 2027.<sup>53</sup>

At the federal level, the **Water Resources Act** regulates the use and protection of waters.<sup>54</sup> The **Waste Water Ordinance** regulates the minimum requirements for discharging waste water into water bodies.<sup>55</sup> The **Laundry Detergents and Cleaning Products Act** regulates the ingredients of laundry detergents and cleaning products on the German market.<sup>56</sup>

These regulations and directives do not go far enough to mitigate the changes caused by climate change and to regulate not only the quantity of available water but also its quality. For example, the EU regulation on water reuse only targets agriculture<sup>57</sup> and ignores all other sectors. Worldwide, 70% of freshwater abstraction is accounted for by the agricultural sector and 20% by industry. In Europe, however, energy production accounts for 40% of agricultural consumption and just under 30% of water consumption. In northern Europe, industry is the largest water consumer.<sup>58</sup> The circulation

of water must therefore be compulsory for each sector.

A holistic policy for clean and readily available water must also be closely linked to regulations for non-toxic products and process chemicals, far beyond detergents. Water contamination is also caused by a lack of material health at the product level, harmful process chemicals, or non-existent material cycles. One key example is when the particles of car and bicycle tires rub off during use; this inevitable abrasion is not created for the biosphere and ends up in the environment as fine dust. In Germany, the abrasion of tires causes around one third of the total microplastic input into water bodies.<sup>59</sup> These relationships must be taken into account in legislation and the existing legal framework must be extended accordingly to EU and federal levels.

Incentives for groundwater and rainwater use, as well as closed water circuits for industry, commerce, and municipalities, can also have an influence on the handling of water at major events. Utilizing used water from the catering sector as water for flushing toilets is one example. Another goal worth striving for would be superior guidelines for cleaning agents used as a way to help ensure that the water leaves the site at least as clean as when it was sourced.

In recent years, medical emergencies due to heat and dehydration have repeatedly occurred both in urban areas and explicitly at events. Clean, free drinking water must therefore be guaranteed in public places and at events. This can be accomplished through appropriate municipal regulations.

## 3.5 CONSTRUCTION

Given the known negative environmental impacts of the construction sector, the transformation of the sector is a high priority politically at the level of the European Union (EU) as well as at the German federal level. The **CEAP**<sup>60</sup> is currently revising the European **Construction Products Regulation**, and the current proposal includes the need for circular design by facilitating "the separation of components and materials" and "avoiding mixed, composite and composite materials."<sup>61</sup>

Another relevant legal adjustment is the revision of the **Waste Framework Directive**, which provides for an increasing recycling rate for construction and demolition waste (including municipal waste) over the years in the context of §14 of the Recycling Act.<sup>62</sup> This requirement applies, in particular, to buildings in the planning phase, which is why many architects and builders attach a lot of importance to the recyclability of the construction products used and require corresponding evidence from the manufacturing companies.

This makes it all the more important to lay down concrete and positively defined quality criteria for the recyclability and material health of building materials in the Construction Products Regulations in the future. Air quality indoors is often significantly worse than outdoors. In addition to particulate matter, harmful chemicals are also responsible for this, which are used in the production of building materials for interiors or are produced in degradation processes.<sup>63,64</sup> Recycling, or recycling quotas, only make sense if materials are harmless to humans and the environment and are fully recyclable in circulation.

The non-toxic and energy-efficient construction and dismantling of buildings is an important element of a C2C-inspired construction method. Today's evaluation systems usually contain predefined upper limits for key figures, such as CO2 equivalents, environmental pollution and gray energy, which must not be exceeded. A shortfall could be positively assessed in this context. Accordingly, a reorganization of authorization processes involving gray energy can accelerate the objective of C2C-inspired buildings in the context of a circular economy.<sup>65</sup> An example of how the dismantling of a building can be legally anchored as a standard procedure instead of demolition is the Austrian ÖNORM B3161. It regulates what must be taken into account in the design and execution of construction projects in order to enable dismantling into single-variety waste fractions that are as free of pollutants and contaminants as possible.<sup>66</sup>

In addition, standards that exist for the use of noise or fire protection materials must be checked and adapted. They should be verified for their environmental impact in the context of resource use by means of a holistic use-cycle analysis of the building materials and the building, and adjusted where necessary.<sup>67</sup>

Within the event industry, strategies of circular construction according to C2C can be tested, for example, by the use of certification systems within the framework of state subsidy programs. Furthermore, guidelines for the reuse and recycling of construction and construction materials can also be issued in event areas. Some of these directives have already been implemented on a voluntary basis at events.<sup>68</sup>

## 3.6 TEXTILES

The CEAP explicitly lists the textile sector as a priority sector.<sup>69</sup> The proposal **for an EU strategy on sustainable and recyclable textiles** is currently under preparation.<sup>70</sup> The document emphasizes the relevance of eco-design, reuse and repair, the use of circular and non-toxic materials and corresponding production processes, the collection, sorting and recycling of textiles, as well as the product responsibility of the manufacturing companies along the entire value chain, including disposal.

At the national level, the BMUV<sup>71</sup>, BMZ<sup>72</sup> and BMWK<sup>73</sup> are working on the implementation of European requirements and framework conditions for a more sustainable textile sector. The National Due Diligence Act, also known as the **Supply Chain Act**, provides companies with a legal framework for fulfilling their human rights due diligence obligations.<sup>74</sup> In addition, the BMZ has launched the **Green Button** as a state seal for sustainable textiles, which recognizes, among other things, the C2C certificate of the Cradle to Cradle Products Innovation Institute.<sup>75</sup> The **Circular Economy Act** shapes the legal framework of the textile and clothing industry by implementing the EU **Waste Framework Directive** at a national level,<sup>76</sup> which sets recycling quotas and separate collection obligations for products such as textiles.<sup>77</sup> It also obliges public authorities in the future to give preference in the procurement process to products that are resource-conscious, low in waste, repairable, low in pollutants, and recyclable.<sup>78</sup>

In order to make textiles and their components recyclable and healthy according to a circular economy in line with C2C and, at the same time,

to improve working conditions along the entire supply chain, the **processes of the value chain must be reoriented and the responsibilities beyond the sales and use phase must be clarified.**

Already, in the design phase of textile products, the framework conditions for recyclability and material health of individual components should be set. This requires **ambitious goals and concrete guidelines for the use of different materials in European and national legislation.**

Textiles are consumables, as they inevitably lose fibers when washed. Therefore, their components – whether fabrics, paints, process chemicals, or yarn – must consist of materials that are biodegradable. Ideally, the material can circulate simultaneously in the technosphere and can therefore be recycled again and again for the production of new textiles. In France, starting in 2025, only washing machines equipped with microplastic filters will be allowed to be sold. At the EU level, it is being discussed that this policy should also be made mandatory throughout Europe and enshrined in the Ecode-sign Directive.<sup>79</sup> This discussion represents a good temporary solution to reduce the introduction of synthetic microparticles into the water with the use of textiles. However, microparticles are already released in textile production, so it is necessary that forms of abrasion are properly produced for the biosphere.

Due to the high water consumption in the cultivation of raw materials such as cotton, recyclable, synthetic materials are considered a major lever in the transformation of the sector. **The further**

**development of recyclable and material-healthy plastics should therefore be further promoted** and particular attention should be paid to the avoidance of microplastics. Only the recyclability and material health of textile products forms a meaningful basis for retrieval systems for used clothing and their recycling through reuse and recycling. **The technological solutions for the collection, sorting, and recycling of used clothing are not yet scalable and their research and development require additional support.**

In addition, **externalized costs must be included in the pricing of textiles.** This includes not only environmental costs, but also social costs. The Supply Chain Act only partially supports this goal. From 2023 onwards, it obliges companies with at least 3,000 employees (1,000 employees from 2024 onwards) to assume responsibility for transparent, socially fair, and sustainable supply chains.<sup>80</sup> Currently, this due diligence only applies to direct suppliers; human rights violations and environmental damage, however, occur principally at the beginning of the supply chain in critical sectors such as the textile industry. Furthermore, environmental aspects are only included in the current law to a small extent. The loss of biodiversity or climate damage are not mentioned, but must be part of a holistic view of a fair and sustainable supply chain. The scope of the law is also too narrow. By definition, enterprises with up to 250 employees are considered to be small and medium-sized

enterprises. So, the law leaves a huge gap by covering only large corporations. Especially in Germany, numerous 'hidden champions' are active in industries that are regarded as critical. The law does not apply to them.<sup>81</sup>

The European Supply Chain Act is only slightly stricter. Although it applies to all companies with more than 500 employees, it only covers about 1% of the European economy. In sectors with a particularly high risk of violations, the regulation should apply to 250 or more employees. The EU has also failed to bring the Supply Chain Act directly into line with the CEAP. While large companies are obliged to analyze the climate impact of their activities, this does not apply to their use of resources. And yet, a different approach to resources along the value chain can lead to a closed circular economy with socially and ecologically sustainable supply chains and contribute to climate protection. **By significantly tightening the supply chain law, not only can fair wages be achieved in the textile industry, but fair, decent working conditions can also become standard. To accomplish this, though, manufacturers must be held accountable for all environmental and social damage along the entire supply chain, in accordance with the 'polluter pays' principle.**

All of these measures would help to ensure that clothing and utility textiles are also compatible with a circular economy according to C2C in the event context.

## 3.7 PLASTICS & PACKAGING

According to the **European Strategy for Plastics in the Circular Economy**, all plastic packaging on the EU market<sup>82</sup> should be recyclable by 2030. The strategy also includes the **EU Directive on Single-Use Plastic Products**<sup>83</sup>, which has banned many single-use plastic products in the EU since July 2021. Further objectives for a different approach to plastic products are set out in the **Waste Framework Directive**<sup>84</sup> and the **Packaging Directive**<sup>85</sup>. Targets include reaching a minimum content of 30% recycled plastic in plastic bottles by 2030.

At the federal level, the **Packaging Act** regulates the product responsibility of packaging manufacturers under waste law.<sup>86</sup> With a legislative amendment, the provisions contained therein have been aligned with the revised EU Waste Framework Directive and the EU Single-Use Plastic Directive. For example, the recycling rate of plastic packaging is expected to increase from just under 60 % to 63 % by 2022.<sup>87</sup> In addition to the ban of disposable plastic products<sup>88</sup> and an expansion of deposit system requirements, the amendment also includes a stipulation for reusable plastics in restaurants, bistros, and cafés starting in January 2023.<sup>89</sup>

While these regulations and directives focus in particular on processes, as well as collection and recycling, the **European chemicals regulation (REACH)**<sup>90</sup> is the largest lever for a circular and material-healthy transformation of the plastics industry. It lays down binding rules for all chemical substances used in the manufacturing of products. By the end of 2022, the EU Commission intends to submit a proposal to adapt REACH to the objectives

of the European Green Deal. The goal of the policy objectives defined in the CEAP would be to make **the composition and authorization of chemical substances dependent on their use scenario**. This can prevent the use of plasticizers or dyes that are harmful to the environment and our health if the material can end up in the biosphere during use. Moreover, incentives would be created for the use of alternative recyclable plastics for the biosphere and technosphere.

The existing regulations for the industry have, so far, only insufficiently addressed the core of the problem – the nature and design of plastic products. At a national level, there are still incentives to produce plastic products that are harmful to the environment and our health. Therefore, the production of new plastics that do not include petroleum is exempt from energy taxes.<sup>91</sup> This automatically makes the use of recycled plastic material more expensive than virgin plastic in the production of plastic products. This indirect subsidization undermines the increase in recycling quotas or a ban on single-use plastic products. **A first measure at the national level must therefore be the elimination of direct and indirect subsidies that run counter to the objective of a circular economy.**

Specifically for the event industry, **requirements or recommendations** for the reduction of plastic waste can be made as part of the approval process. In addition, it is conceivable to **demonstrate planned measures for the recycling of plastics**. Austria offers inspiration for this concept, where events and locations are awarded the Austrian Ecolabel label if

they meet certain minimum requirements, such as waste separation systems in all event areas or the use of reusable dishes.<sup>92</sup>

## 3.8 DIGITALIZATION

At the European and German level, **data protection laws**<sup>93</sup> set the framework for consumer protection in dealing with digitalization. Politicians have recognized the relevance of digitalization in promoting the circular economy. For example, a study by the BMUV shows enormous optimization potential of the German waste sector through digitalization.<sup>94</sup> However, accelerating the digital circular economy requires **established standardization and standardization bodies at the national and European level**. Definitions, targets, incentives, and regulatory tools should promote and encourage the use of digital technologies in the context of the circular economy.

Both the CEAP and the coalition agreement of the Federal Government provide for product and material passports for particularly environmentally-damaging and resource-intensive industries such as those for textiles, mobility/batteries<sup>95</sup> or construction.<sup>96</sup> For batteries, the product passport will be developed within the framework of an EU directive that will become mandatory in 2026. It is introduced as a standard for all batteries (mobile and stationary) from 2KW and therefore also includes the batteries used in e-scooters, e-bikes, and in the area of "home storage."

For a closed circular economy, however, **all chemical processes and substances, material properties, quantities and qualities of product components, as**

**well as manufacturing processes and circumstances of the production of all goods, must be known, digitized, and transparently published**. Only then will it be possible to know at any given time, for each resource, in which state and at which location it is located and, accordingly, to close material and substance cycles, in particular within the technosphere. The implementation of a **Product Circularity Data Sheet**, as introduced by Luxembourg in order to obtain a kind of fingerprint of products<sup>97</sup>, could significantly accelerate this transformation towards a circular economy with a focus on quality at the EU level.

Product service systems (PSS) can make a different approach to finite resources attractive by combining products and services, and Maintenance services can, for example, extend the usage phase of a product. PSS also means that the product, and therefore, all of the resources built into it, remain under the ownership of the manufacturer. This increases the incentive to use these resources in such a way that they can be recycled after use either directly or through single-origin recycling. **Product service models must be promoted and their implementation made possible by appropriate provisions in the data laws. And this must be executed in such a way that they contribute to a circular economy in line with C2C and, at the same time, protect the rights of consumers.**

## 4. CONCLUSION

The use of digital technology, for example, for measuring visitor numbers or flow, for energy and power management, for predictive maintenance of stages or stage components, as well as digital material passports, can also enable a new, effective use of resources in the event context.

Labor Tempelhof makes tomorrow's world tangible. The components of the C2C principle, including their applications, are made visible on the basis of individual elements that come into play when organizing large-scale events. Labor Tempelhof serves as proof that many necessary innovations are already possible today while simultaneously making it abundantly clear that we continue to face major challenges. If a circular economy is to become a reality, starting with the design of products and processes and, ultimately, creating economic, ecological and social added value, there is still substantial progress to be made. In particular, the political framework conditions still very often stand in the way of real transformation processes.

At present, political regulations for major events focus primarily on noise emissions. There are many other areas where there is a great need for new guidelines to stimulate and facilitate climate- and resource-positive events. Labor Tempelhof illustrates that holistic guidelines and targeted subsidies are necessary to enable the switch to 100 % renewable energy from recyclable facilities. Policies must include infrastructure for retrieval systems, collection, sorting, and recycling of diverse waste.

Stricter rules and ambitious targets with regard to the quality, production, and recycling of plastics are urgently needed to ensure that the use of recyclable and material-healthy packaging materials is not only applied in pilot projects, but rather becomes the norm. Sustainable and emission-free mobility concepts, the targeted promotion of regenerative and organically produced and locally sourced food, as well as a holistic nutrient and CO<sub>2</sub> management are a crucial part of the political agenda. In general, more incentives, support and, where necessary, specific requirements for approval processes, are needed to support event organizers in executing climate- and resource-positive events.

Labor Tempelhof shows that these regulatory gaps do not only apply in the context of events. They must be closed in order to achieve the political goal of a circular economy, in which we can leave positive ecological, economic, and social footprints in tomorrow's world. Labor Tempelhof is proof that change is possible in the event industry and beyond – if the will and a sense of curiosity for alternative, truly beneficial solutions are present. The project is intended to stimulate rethinking, encourage reorientation, and invite change.

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